

**REMARKS****Status of the Claims**

The pending office action addresses claims 1-28. Claims 1-28 stand rejected, with claims 1, 16, 22 and 26 being independent claims. By this response, Applicants have amended claims 1, 4, 6, 7, 10, 11, and 12, and canceled claims 13-21 and 25-28. Upon entry of this amendment, claims 1-12 and 22-24 will remain pending in the application, with claims 1 and 22 being independent.

Applicants have amended claim 1 herein to clarify the nature of the claimed invention. These amendments include clarifying that the Hierarchical Memory (HM) includes higher and lower level nodes, and that some of the nodes are lowest level nodes that include basic features of the candidate objects or events. This amendment is supported at least in ¶ 13 of the application as published, particularly beginning at line 9 of that paragraph (all citations to the application herein refer to the application as published in US 2005/0021338).

Applicants have further amended claim 1 to recite definitions of Bottom Up and Top Down within the claims and to recite that Bottom Up and Top Down inputs are used by the Selective Attention Module (SAM) to modulate the feature detection. The application makes clear, for example in ¶ 13, that the recognition system moves the window of attention for its Front End Module (FEM) based on high level contextual constraints (Top Down) and that the movement of that window depends upon bi-directional signal flow (Top Down and Bottom Up) within the Hierarchical Memory. "Top-Down processing" is expressly described in this context of providing a "high-level" or "T-D" (Top Down) input in ¶ 14 of the application. In ¶ 15, the second half of the bi-directional signal flow is described with feature detection information (low level information) being provided as a Bottom Up input for Bottom Up processing to result in the exclusion of certain top level candidates. Bottom Up (B-U) and Top Down (T-D) are referred to in this context throughout the application, and their definition is now expressly provided in claim 1, as are the terms Bottom Up input and Top Down input.

Claim 4 has been amended to specify that the top-down signal processing that derives feature probability measures is applied to provide the Top Down inputs recited in claim 1 that

help is fed into the SAM to drive the FEM. This is expressly supported in the application at ¶ 14.

Claims 6-7 and 10-12 have been amended primarily to remove language that has been objected to by the Examiner.

**Claim Rejections - 35 USC §112, first paragraph**

The Examiner has rejected claims 4, 10, 11, 12 and 15 under 35 U.S.C. 112, first paragraph, as failing to comply with the description requirement.

***Claim 4:***

Specifically with regard to claim 4, the Examiner states:

The claim recites "top-down signal flow" in line 1. There is no description in the specification or in the claim as to what this top-down signal flow means and how it functions in the method. Moreover, there is no description as to what is considered as being "the top". Therefore, one of ordinary skill in the arts would not know how to make and use the invention without undue experimentation since the intent of this limitation in the claim cannot be established from the claim or from the specification.

Applicants have amended claims 1 and 4 to more specifically define Top Down and Bottom Up in the claims, and these definitions are taken from the specification. In particular, definitions of Top Down and Bottom Up are provided and the use of Top Down and Bottom Up processing is described in ¶ 13 and ¶ 14. The application of these terms as a "signal flow" with specific examples of that signal flow are described in ¶ 15. Further specific examples of Top Down and Bottom Up processing are provided in ¶ 39 and ¶ 40, with a detailed example in ¶ 42. Applicants believe that the specification makes clear that Top Down processing and top-down signal flow are synonymous as described in the specification, however, in an attempt to address the Examiner's concerns, top-down signal flow has been replaced with Top Down processing in the claim.

***Claim 10:***

Specifically with regard to claim 10, the Examiner states:

The claim recites "connected in bottom-up fashion" in line 2. There is no description in the specification as to what bottom-up means or exactly what is considered as being "the bottom". Therefore, one of ordinary skill in the arts would not know how to make and use the invention without undue experimentation since the intent of this limitation in the claim cannot be established from the claim or from the specification.

The Bottom Up direction is defined in the specification and in Claim 1 as noted above with respect to the amendments to claim 1. The "bottom," quite simply, is the "lowest level," namely, "basic features, such as line segments for visual information or basic phonetic sounds for auditory information." [¶ 13.] This definition of bottom is consistent with every day English and is required by the descriptions found in the specification. "Bottom Up connections" are specifically described in ¶ 35.

Applicants have attempted to address the Examiner's concerns about "Top Down" and "Bottom Up" by defining those terms in claim 1 in a way that is provided in the specification. If further definition would help to address the Examiner's concerns, suggestions from the Examiner would be welcome.

***Additional Claims:***

Similar amendments and explanations apply to claims 11, 12 and 15.

***Claim Rejections - 35 USC §112, second paragraph***

The Examiner has rejected claims 1, 6, 7, 10, 12-15, 17, 19, and 25 under 35 U.S.C. 112, second paragraph, as failing to comply with the description requirement.

***Claim 1:***

Specifically with regard to claim 1, the Examiner states:

The claim recites the limitation "'the presented object or **event**" in line 12. There is insufficient antecedent basis for this limitation in the claim. Note that the claim recites "candidate events" in previous lines but there is no recitation of an **event**.

Applicants have amended claim 1 to recite "a presented object or event." The antecedent basis for this phrase as originally recited was found in the preamble. Regardless, Applicants submit that the amendment obviates this grounds for rejection.

***Claim 6:***

Specifically with regard to claim 6, the Examiner states:

Regarding claim 6, the phrase "for example" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Moreover, in line 12, the claim recites "e.g.", which renders the claim indefinite because it is unclear whether the limitation(s) following the "e.g." is part of the claimed invention. See MPEP § 2173.05(d).

Applicants have amended these claims to remove this language.

***Claim 7:***

Specifically with regard to claim 7, the Examiner states:

The claim recites "other type of higher level contextual constraint" in lines 2-3, 4, 6 and 7-8. The intent of this limitation cannot be established from the claim since it is not clear what these other type of higher level contextual constraint encompass, therefore rendering the claim indefinite

Moreover, the claim contains subject matter inside parenthesis in lines 3-4. It is not clear if this subject matter is intended to be limitations in the claim.

Applicants have amended these claims to remove this language.

***Claim 10:***

Specifically with regard to claim 10, the Examiner states:

The claim recites the limitation "the item" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Applicants have amended these claims to remove this language.

**Claim 12:**

Specifically with regard to claim 12, the Examiner states:

The claim recites the limitation "**the current subset** of (non-excluded) candidate objects or events" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Moreover, the claim contains subject matter inside parenthesis in lines 3 and 4. It is not clear if this subject matter is intended to be limitations in the claim.

The claim also recites the phrase "for example", which renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Applicants have amended these claims to remove this language.

**Claim 13:**

Specifically with regard to claim 13, the Examiner states:

The claim recites "low non-zero measure" on lines 3 and 5 and "high measure" in line 4. The terms "low" and "high" are relative terms which render the claim indefinite. These terms are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

Applicants have canceled this claim.

**Claim 14:**

Specifically with regard to claim 14, the Examiner states:

The claim recites the limitation "the set of processes" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Moreover, the claim contains subject matter inside parenthesis in lines 5-7. It is not clear if this subject matter is intended to be limitations in the claim.

The claim also recites the phrase "for example", which renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Applicants have canceled this claim.

**Claim 15:**

Specifically with regard to claim 15, the Examiner states:

The claim contains subject matter inside parenthesis in line 2. It is not clear if this subject matter is intended to be limitations in the claim.

The claim also contains an ending period in line 6 followed by additional subject matter. The claim(s) must be in one sentence form only. It is not clear if the intent of this additional subject matter is to further describe the subject matter recited before the ending period or if this is a different limitation.

Line 9 recites "a close match". The term "close" is a relative term which render the claim indefinite. These terms are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

The claim also recites the phrase "for example", which renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Applicants have canceled this claim.

**Claim 17:**

Specifically with regard to claim 17, the Examiner states:

The claim recites the limitation "said **selective** detecting" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Applicants have canceled this claim.

**Claim 19:**

Specifically with regard to claim 19, the Examiner states:

The claim recites the limitation "the **selective** detecting" in line 1. There is insufficient antecedent basis for this limitation in the claim.

The claim recites "high measure" in line 3 and "low non-zero measure" on line 4. The terms "low" and "high" are relative terms which render the claim indefinite. These terms are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

Applicants have canceled this claim.

***Claim 25:***

Specifically with regard to claim 25, the Examiner states:

The claim recites "high measure" and "low non-zero measure" on lines 2-3. The terms "low" and "high" are relative terms which render the claim indefinite. These terms are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

Applicants have canceled this claim.

**Claim Rejections - 35 USC §102**

The Examiner has rejected claims 1-6, 8-10, 13-14, 16-19, and 21-28 under 35 USC 102(b) as being anticipated by Aref (U.S. Patent No. 5,528,701). As Applicants believe that Aref does not render the independent claims unpatentable, Applicants address primarily the two remaining independent claims in the application – claims 1 and 22. As to these two claims, the Examiner states:

***Claim 1:***

Specifically with regard to claim 1, the Examiner states:

Aref anticipates a device for recognition of a presented object (**Aref:** abstract; Examiner's Note (EN): the input data is a presented object. Matching the input data to a objects in the tree is recognition), such device comprising a hierarchical memory (HM) in which is stored a data set representative of candidate objects or events (**Aref:** abstract; C2, L18-41; EN: the tree database is a hierarchical memory and the plurality of objects stored are candidate objects), each candidate object or event having one or more features and said data set being arranged as a hierarchical data set having higher level nodes comprising

candidate objects or events and lower level nodes corresponding to features of the candidate objects or events, wherein higher level nodes are associated with corresponding lower level nodes and lower level nodes are associated with corresponding higher level nodes (**Aref:** **abstract;** C1, L61 to C2, L5; C2, L18-41; C3, L28-47; C4, L61 to C5, L40; C5, L53-64, C6, L17 to C7, L29; C8, L16-42; EN: paragraph 11 applies. The HMM's will contain the features. Having a higher level tree hold the individual phrases (candidate objects) and a tree holding the individual word in the form of their component phonemes (features). Moreover, the HMM's in each node are considered lower level nodes (the states) associated with a higher level node (the node itself)); a front end module (FEM), responsive to a feature of the presented object or event to produce feature detection information (**Aref:** C4, L43-67; Fig. 1; EN: the display device and the transducer will serve as the front end module. The movement of the pen are used to form feature vectors); a selective attention module (SAM), said SAM modulating flow of said feature detection information so as to determine a reduced set of candidate objects or events as potentially corresponding to the presented object or event, said SAM further receiving information from the higher level nodes for effecting said modulating whereby the device selectively attends' feature detection information to progressively exclude candidate objects and identify the presented object or event with enhanced efficiency (**Aref:** C4, L43 to C5, L40; C5, L53-64, C6, L17 to C7, L29; C8, L16-42; C11, claim 1; EN: paragraph 11 applies. The HMM's are considered a SAM since it will use the ' feature information (modulate the flow of the features) to select the best match between the input sequence and an object in the database, therefore excluding other objects from the search path).

### **Claim 22:**

Specifically with regard to claim 22, the Examiner states:

Aref anticipates a recognition method for identifying a presented stimulus (**Aref:** **abstract;** EN: the sequence of input data is a stimulus), such method comprising the steps of: a) presenting an input stimulus for recognition (**Aref:** **abstract;** C2, L18-41); b) identifying a set of candidate objects or events (**Aref:** **abstract;** C2, L18-41), the candidate objects or events possessing features (**Aref:** C4, L43 to C5, L40; C5, L53-64; C6, L17 to C7, L29; C8, L16-42; C11, claim 1; EN: the pen strokes will generate feature vectors. Moreover, minima, maxima and inflection points are



features of the objects), wherein the candidate objects or events and features form an interconnected hierarchy wherein an object or event node at a higher level is linked to feature nodes at a lower level corresponding to the object or event node, and wherein a feature node at the lower level is linked to one or more corresponding object or event nodes (**Aref:** abstract; C1, L61 to C2, L5; C2, L18-41; C3, L28-47; C4, L61 to C5, L40; C5, L53-64, C6, L17 to C7, L29; C8, L16-42; EN: paragraph 11 applies. The tree is a hierarchy. The HMM's are considered lower level nodes containing features and are connected to an object node. Having a higher level tree hold the individual phrases (candidate , objects) and a tree holding the individual word in the form of their component phonemes (features)) also reads on this claim limitation); c) assigning a measure to features at the lower level, setting a window of attention identifying feature domain information of interest, detecting a feature in the window of attention, wherein said setting a window of attention is performed responsive to said measure so that processing of the detected feature efficiently reduces the candidate set (**Aref:** C2, L18-41; C5, L53-64; C6, L17 to C7, L15; C7, L30-63; 11, claim 1 EN: the path followed is considered a window. The probability is a measure used to select the path); and d) re-defining the set of candidate objects or events consistent with the detection of said feature (**Aref:** C2, L18-41; C5, L53-64; C6, L17 to C7, L15; C7, L30-63; C11, claim 1; EN: selecting the objects having the element (features) having the highest acceptance values).

Aref discloses a method for matching a sequence of input data representing a *continuous input object* to a plurality of component objects stored using a Trie data structure. [Col. 2, lines 18 to 41.] The exemplary embodiment described by Aref is a system for recognizing *continuous* handwritten text – though Aref's method is said to be applicable to other *continuous data*. [Col. 3, lines 27 to 33.]

Aref notes that several authors have used hidden Markov models to model handwriting and to address the difficulty in differentiating between characters in the handwritten alphabet. [Col. 4, lines 31 to 38.] Aref's invention is said to be to reduce the level of computation needed to recognize a word by combining the hidden Markov model with a Trie data structure that represents all possible words in the database. [Col. 5, lines 52-56.]

Because Aref is directed to combining a hidden Markov model with a Trie data structure to reduce the level of computation required to recognize a *continuous input object*, such as *continuous* handwritten text – Aref detects features *sequentially* – following the moving pen:

- Aref uses “a left to right HMM structure, where no state transitions are allowed which jump more than one state ahead.” [Col. 4, lines 61 to 63.]
- “As each letter is recognized, the strokes in the input sequence that correspond to that letter, as delimited by the minima, maxima and inflection points, are deleted from the input sequence, and a new level in the Trie is executed to identify the next letter in the word.” [Col. 6, lines 61-65.]

This sequential approach is further exemplified by the example illustrated in Figures 8 and described column 6, line 66 to column 7, line 14, in which the word “bagel” is analyzed by first taking the “b”, and then the “a”, and then the “g”, and presumably so on.

Claim 1 of the present application recites a hierarchical memory (HM), a front end module (FEM) for detecting features, and a selective attention module (SAM) that determines a window of attention for the (FEM) to generate feature detection information. The SAM does not direct the FEM to generate that feature detection information sequentially, but rather takes Bottom Up input (feature detection information from the FEM) and Top Down input (information from higher level nodes in the HM) to selectively choose which lower level features will become the next Bottom Up input in order to enhance the efficiency with which the recognition system identifies the presented object or event. That is, as explained in the specification, Top Down inputs are used to determine a window of attention for the FEM that results in consideration of a further Bottom Up input that has a higher likelihood of eliminating candidate objects or events – the use of Top Down inputs to select the next features considered as Bottom Up inputs necessarily differentiates over Aref which only takes the Bottom Up feature input sequentially.

Claim 22 similarly recites “assigning a measure to features at the lower level, setting a window of attention identifying feature domain information of interest, detecting a feature in the window of attention, wherein said setting a window of attention is performed responsive to said measure so that processing of the detected feature efficiently reduces the candidate set.” This process of assigning a measure to each feature is a Top Down processing as explained in ¶ 14, and it is used to filter which features are selected for further processing in a Bottom Up direction as further explained in ¶¶ 15-18. This feature is different from the sequential processing of Aref.

Accordingly, neither claim 1, nor claim 22, nor any of the claims dependent from claims 1 or 22, are anticipated by Aref.

**CONCLUSION**

If the Examiner believes that an interview would facilitate the resolution of any outstanding issues, she is kindly requested to contact the undersigned.

In the event that a petition for an extension of time is required to be submitted at this time, Applicant hereby petitions under 37 CFR 1.136(a) for an extension of time for as many months as are required to ensure that the above-identified application does not become abandoned.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 141449, under Order No. 102282-17.

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Respectfully submitted,



Ronald E. Cahill, Reg. No. 38,403  
Attorney For Applicants  
NUTTER MCCLENNEN & FISH, LLP  
World Trade Center West  
155 Seaport Boulevard  
Boston, Massachusetts 02210-2604  
Tel. (617) 439-2782  
Fax (617) 310-9782